It's 9p..Do know where your wild animals are?
LESSON PLAN – Population Estimation

Content area: Animal characteristics and behavior, population estimations; ratios

Audience: HS Biology, FFA, AP Environmental Science,

NC Standard Course of Study Correlations (Science):

FFA Natural Resources II: 5.0, 5.01 & 5.02

Biology: 2.1, 2.2

Setting: Classroom

Duration: class period

Objectives: Students will:

1. View remote cameras photos and employ observation skills to distinguish different wildlife species and number of male, female and unique deer.
2. Calculate deer population estimates and male:female ratios and discuss implications.
3. read a scenario, calculate the deer population and make a harvest recommendation. habitat.

Key terms: Density dependent factors, unique male (deer species), population estimation

Classroom materials:
- Projector & screen

Lesson Overview:
Wildlife biologists, hunters, land managers, park managers and farmers are all interested, maybe for different reasons, in knowing how many deer are on their land. If you have many acres it is difficult and unrealistic to count individual animals. Scientist have developed reliable methods to estimate minimum population numbers for wildlife animals. Today, many scientist, citizen groups, land managers and hunters use remote cameras to estimate the deer population in specific areas. This activity will demonstrate how remote camera data is used.

Background: see White-tailed Deer species webpage.

Introducing Lesson: Query students as to why hunters and land managers want to know the number of deer on their property:

Help manage their land better

Help plan for hunting season

Determine whether the habitat can support the population

Help determine if habitat changes need to be made

Population Estimation - Remote Camera Activity: Use 'Smile..Your on Camera' PowerPoint and 'Population Estimation – Remote Camera Activity' worksheet (included with this lesson).

1. First set of photos represents a variety of wildlife: fox, raccoon, squirrel, rabbit, coyote. As flip through these photos students identify the animal and become use to some of the drawbacks of remote camera photos: must see identifying traits of animal

2. Use Remote Camera Activity worksheet for second set of photos in PowerPoint.

   a. Before start activity define what 'unique' deer means: Deer distinguished from other deer due to a physical trait. Each male deer's antler are unique in appearance from other male deer antlers. May want to show some photos here a examples.

   b. Question1 - Use hatch marks to record: males, does, fawns and unique males. Point out difficulty in determining unique males especially if males have spike antlers.
   How solve problem? Take many photos over a period of 10-14 days.
   Assumption: will have enough photos to distinguish all the unique males

   c. Complete Q2 & Q3 on Population Estimation - Remote Camera Activity and discuss.

Population Estimation – Remote Camera Activity (teacher copy)

1. View remote camera photos of deer & use hash tags to record number of deer.
   .

Bucks	Unique bucks	Does	Fawns
12	3	18	3

2. Example of how to use remote camera data to estimate population numbers

Data (collected 1/11-1/21)	Population estimate:
Total bucks photographed: 148	# Bucks = 3
Total does photographed: 546	# Does = 0.02 x 564 = 10.9 or 11
Total fawns photographed: 64	# Fawns = 0.02 x 64 = 1.28 or 1
# individual bucks: 3 **	Total population = 15
Correction factor: 3/148 = .02 Unique buck # / total buck #	

** A total of 148 bucks counted in all photos taken but there were only 3 unique bucks. This means those 3 bucks visited the bait station over and over and had their photo taken many times.   We make the assumption that the same thing happens with the unique females and the unique fawns.   Unique bucks can be more easily distinguished than unique does or fawns so the buck data are used to determine a correction factor that is used for all segments of the population represented.

2a. What is the ratio of males to females?   Answer: 3 : 11 or almost 1 : 4

2b. What population prediction can be made from the above numbers?

   Answer: Each female has an average of 2 babies/ year
            Females begin breeding at one year of age
             Assume 50/50 male/female offspring
            11 females = 22 more deer born this spring(11 are females)
            next year 22 females = 44 more deer(22 are females)

2c. How could the above information be used to inform hunting regulations?

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Helps determine the number of females or male limits

In this case the female limit will be much higher and it may be decided not to shoot
any males to allow the male population to mature

Note: The above question and answer are for discussion purposes only. Hunting regulations do not change based
on one year of data. The above type of numbers would have to be shown to be occurring over a period of
several years of time.

2d. What is the fawn: doe ratio?   1:11   Why is the ratio so low?
Possible answers:
Not enough food; does can't produce enough milk; babies are weak & die
Large number of predators in the areas.   What are possibilities?
High incidence of fawn/car interactions
Due to lack of food some does do not have energy to conceive and bear young

3. Use the following information to determine the number of deer/square mile in an area

Buck	Unique Buck	Doe	Fawn	Acres sample
22	6	58	12	500

1. Calculate the unique buck correction factor: Answer: 6/22 = .28
2. Use correction factor to determine female population: 0.28 x 58 = 16
3. Use correction factor to determine fawn population: 0.28 x 12 = 3
4. Total population / 500 acres =   6 + 16 + 3 = 25
5. The carrying capacity for deer is   25.6 acres / deer

Is this population below, at or above carrying capacity?

500 acres X 1 deer/ 25.6 acres =   19 deer

Yes this population is above carrying capacity.

How much land would be needed to support this many deer?

25.6 acres/ deer   x   25 deer =

Other things to consider:

carrying capacity is going to be different for different types of
habitat. Oak/beech forest vs pine/meadow area.

Legal taking of deer: how many would be taken.

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Remote Camera Activity (student copy)

1. View remote camera photos of deer & use hash tags to record number of deer.

Buck	Unique buck	Doe	Fawn

2. Example of how to use remote camera data to estimate population numbers.

Data collected: 1/11- 1/21	Population estimate:
Total bucks photographed: 148	Buck =
Total does photographed: 546	Doe =
Total fawns photographed: 64	Fawn =
# individual bucks: 3	Total population =
Correction factor: unique buck # / total buck #	

a. What is the male to female ratio?

b. What population prediction can be made from the above numbers?

c. How does WRC use this type of information?

d. What is the doe to fawn ratio?

3. Use the following information to answers 3a-e.

Buck	Unique Buck	Doe	Fawn	Acres sampled
22	6	58	12	500

    a. Calculate the unique buck correction factor:

    b. Use correction factor to determine female population:

    c. Use correction factor to determine fawn population:

    d. Total population / 500 acres =

    e. If the carrying capacity for deer is: 25.6 acres / deer
        Is this population below, at or above carrying capacity?